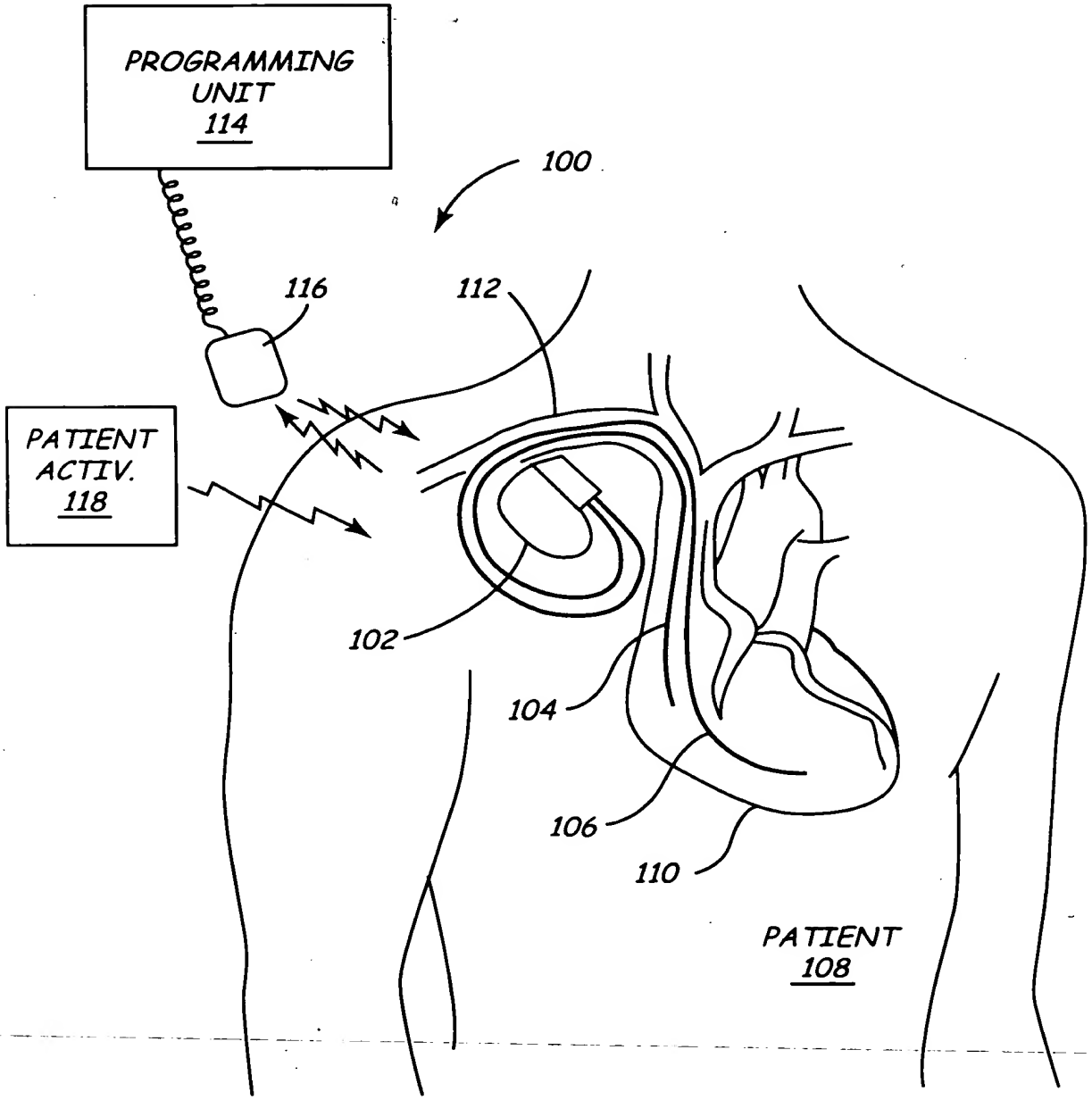
PROGRAMMING UNIT 114
100
116
112
PATIENT ACTIV. 118
102
104
106
110
PATIENT 108

FIG. 1

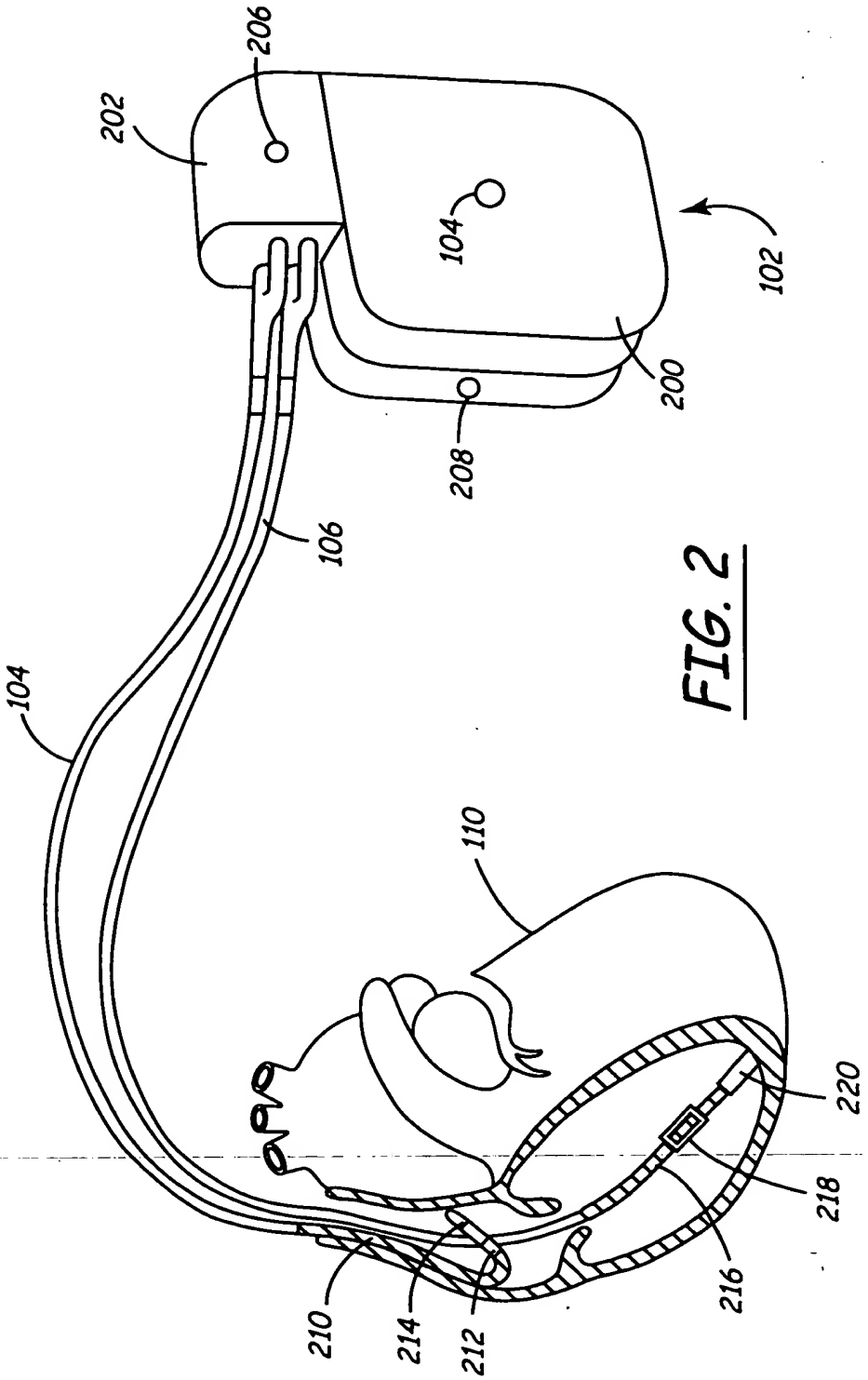

FIG. 2

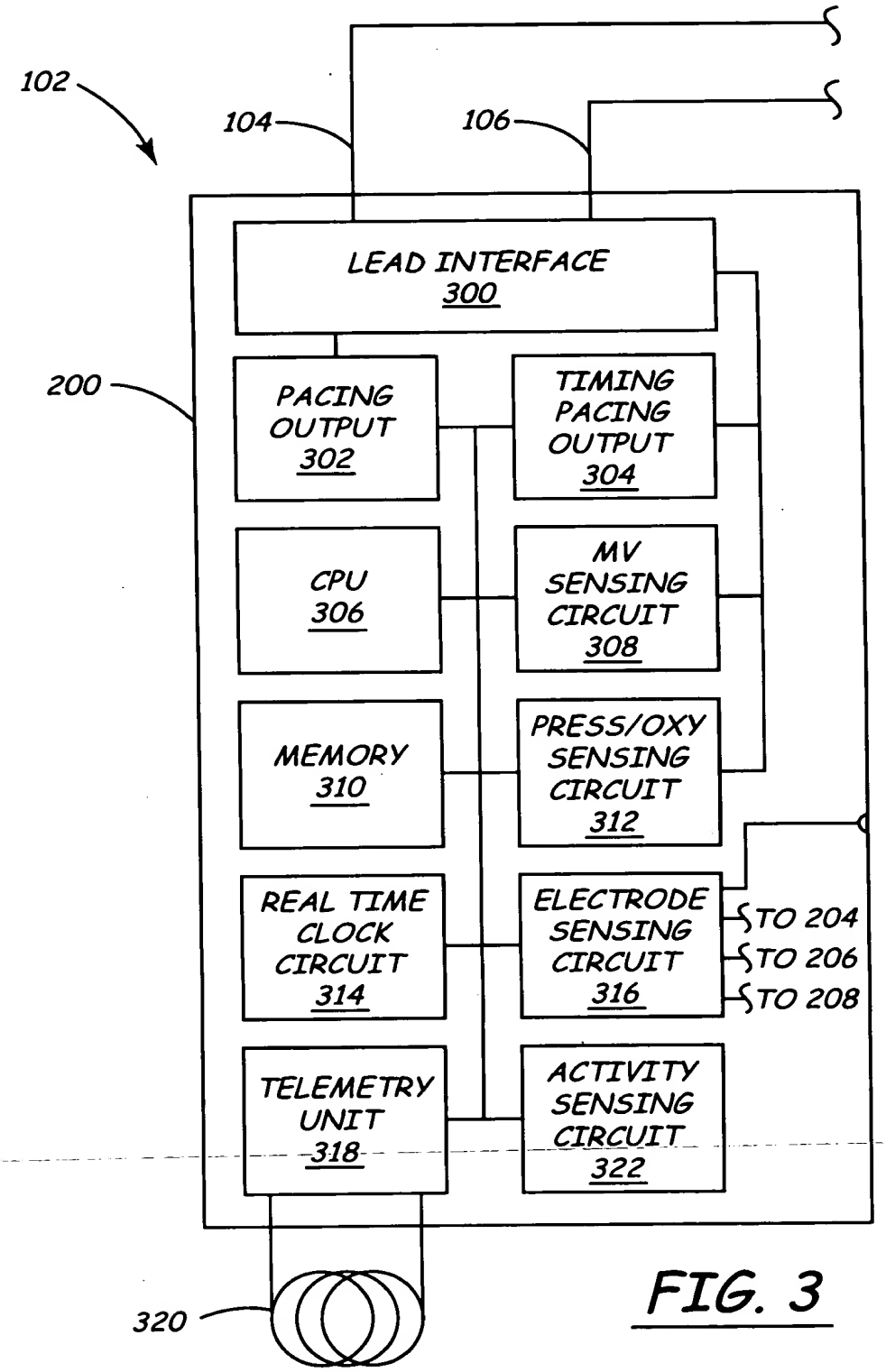
102
104
106
200
LEAD INTERFACE
300
PACING
OUTPUT
302
TIMING
PACING
OUTPUT
304
CPU
306
MV
SENSING
CIRCUIT
308
MEMORY
310
PRESS/OXY
SENSING
CIRCUIT
312
REAL TIME
CLOCK
CIRCUIT
314
ELECTRODE
SENSING
CIRCUIT
316
TO 204
TO 206
TO 208
TELEMETRY
UNIT
318
ACTIVITY
SENSING
CIRCUIT
322
320

FIG. 3

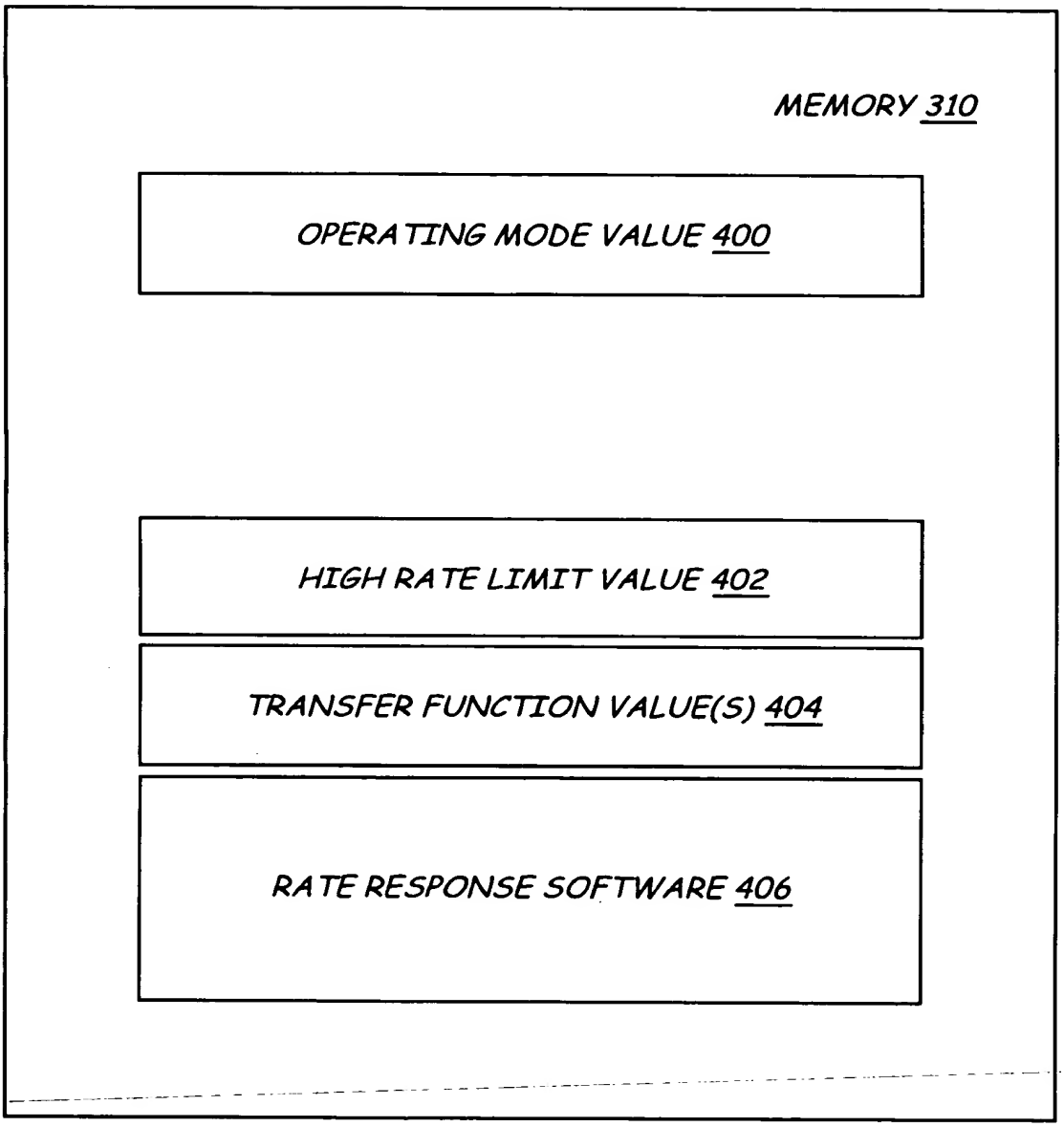
MEMORY 310
OPERATING MODE VALUE 400
HIGH RATE LIMIT VALUE 402
TRANSFER FUNCTION VALUE(S) 404
RATE RESPONSE SOFTWARE 406

FIG. 4

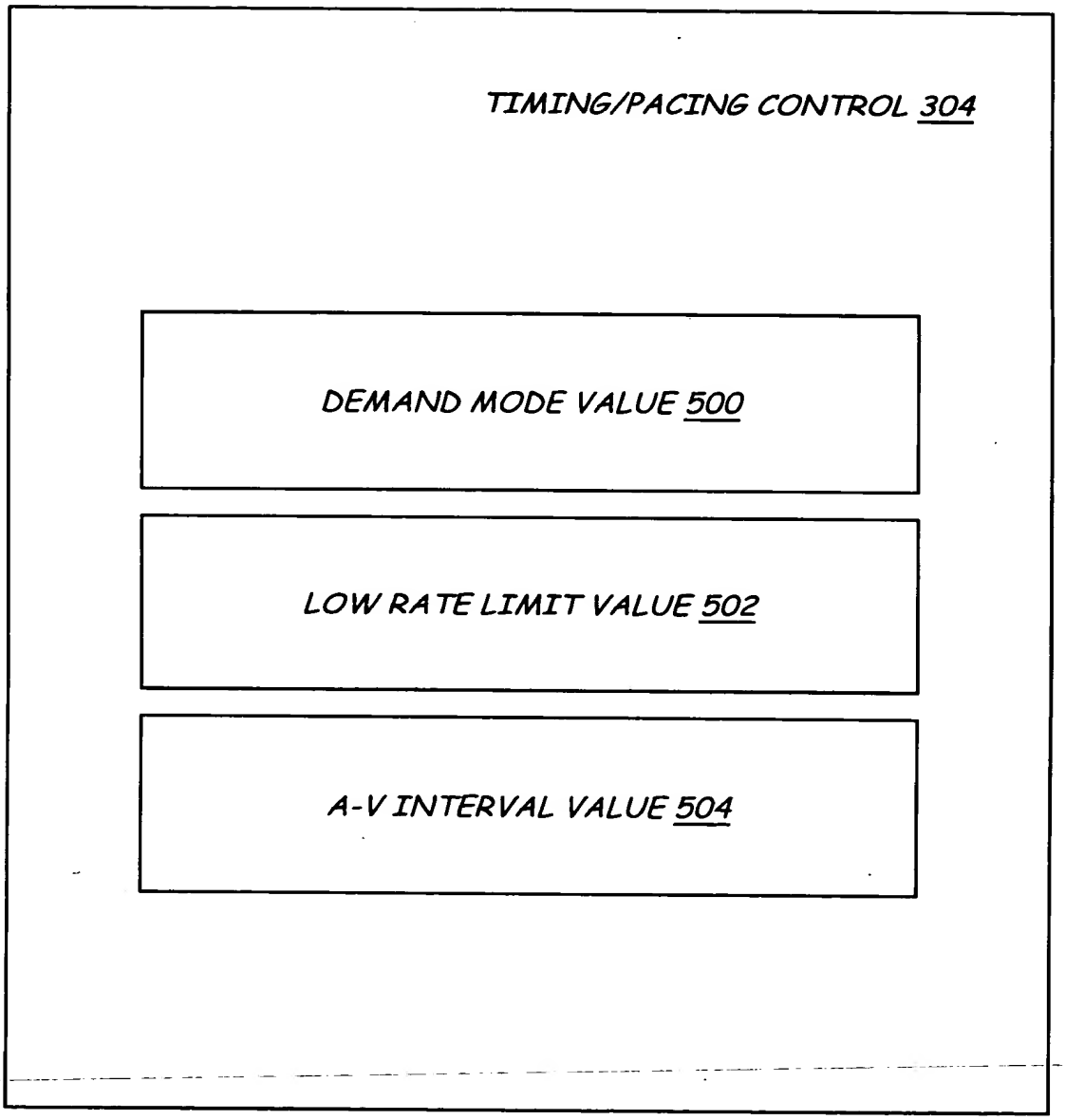
TIMING/PACING CONTROL 304
DEMAND MODE VALUE 500
LOW RATE LIMIT VALUE 502
A-V INTERVAL VALUE 504

FIG. 5

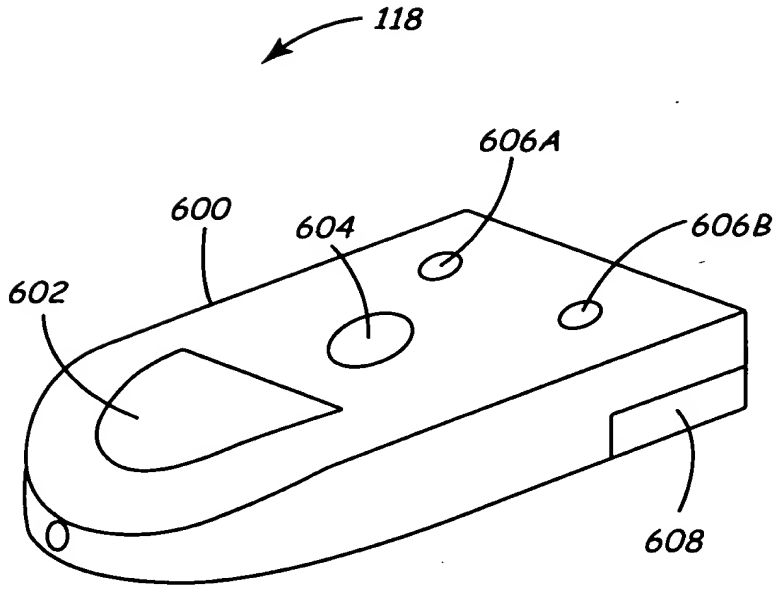

FIG. 6

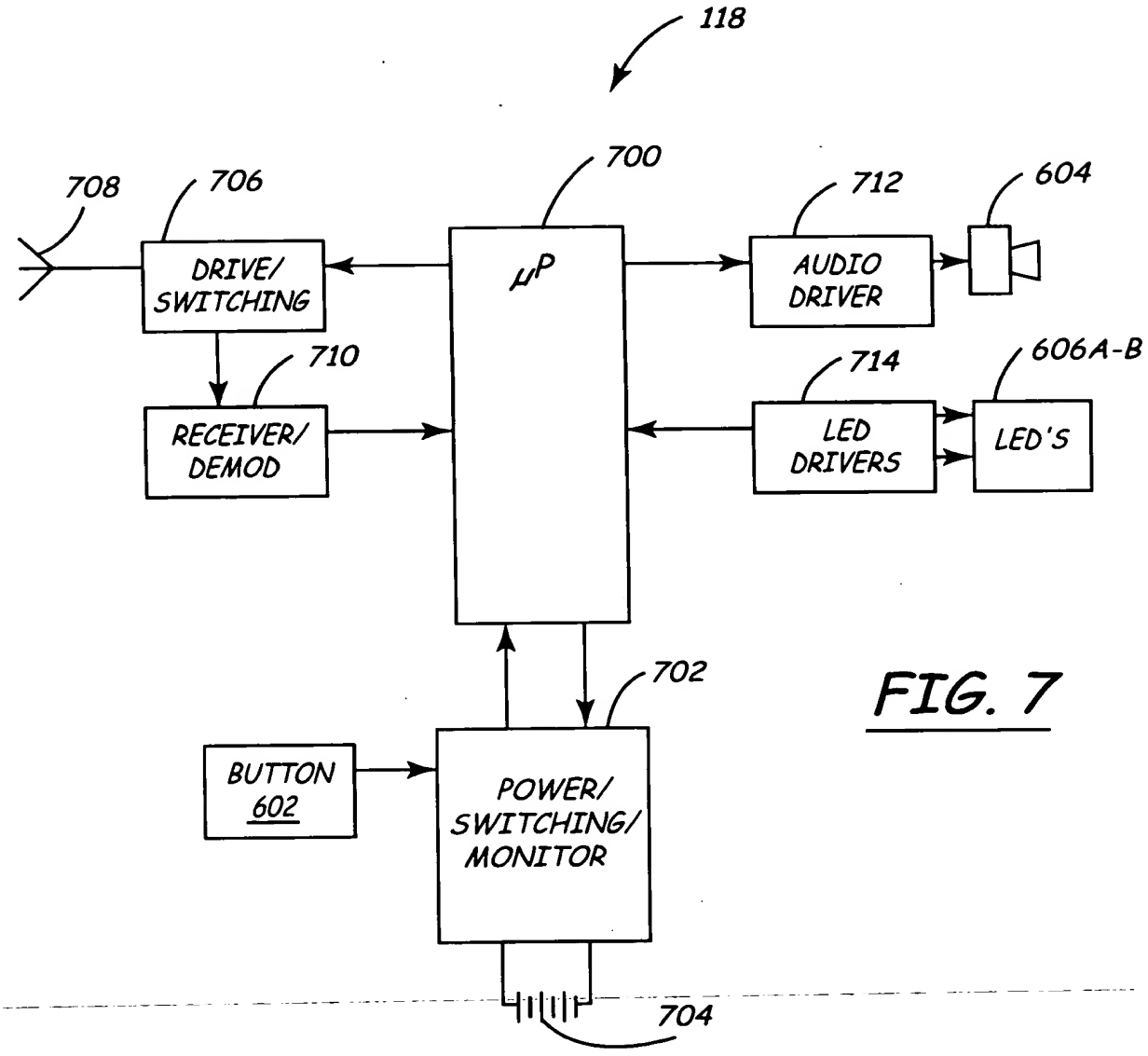
118
700
708
706
712
604
DRIVE/ SWITCHING
μP
AUDIO DRIVER
710
714
606A-B
RECEIVER/ DEMOD
LED DRIVERS
LED'S
702
BUTTON 602
POWER/ SWITCHING/ MONITOR
704

FIG. 7

8/21

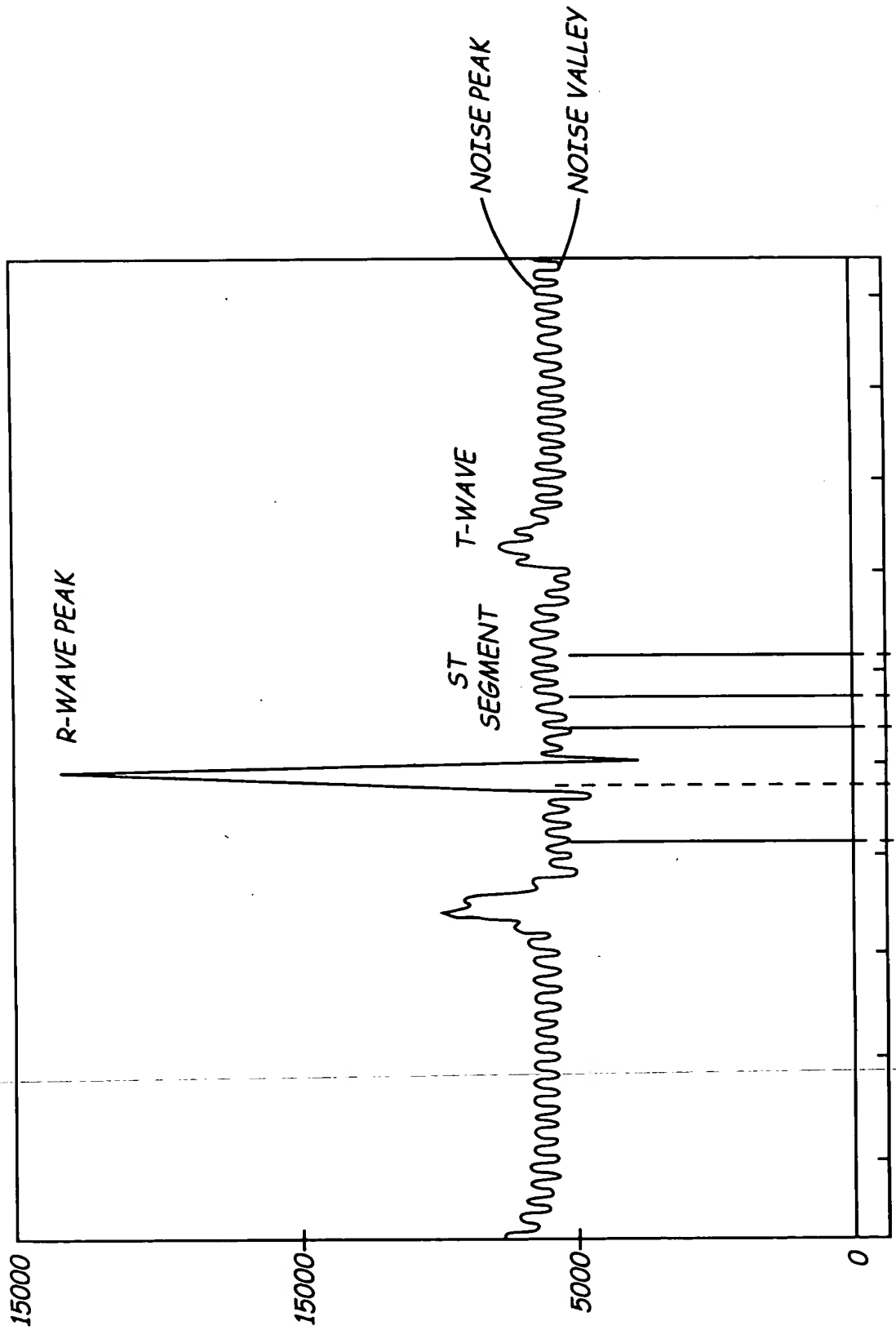
NOISE PEAK
NOISE VALLEY
T-WAVE
ST SEGMENT
R-WAVE PEAK
1
2
3
4
RS
15000
15000
5000
0

FIG. 8

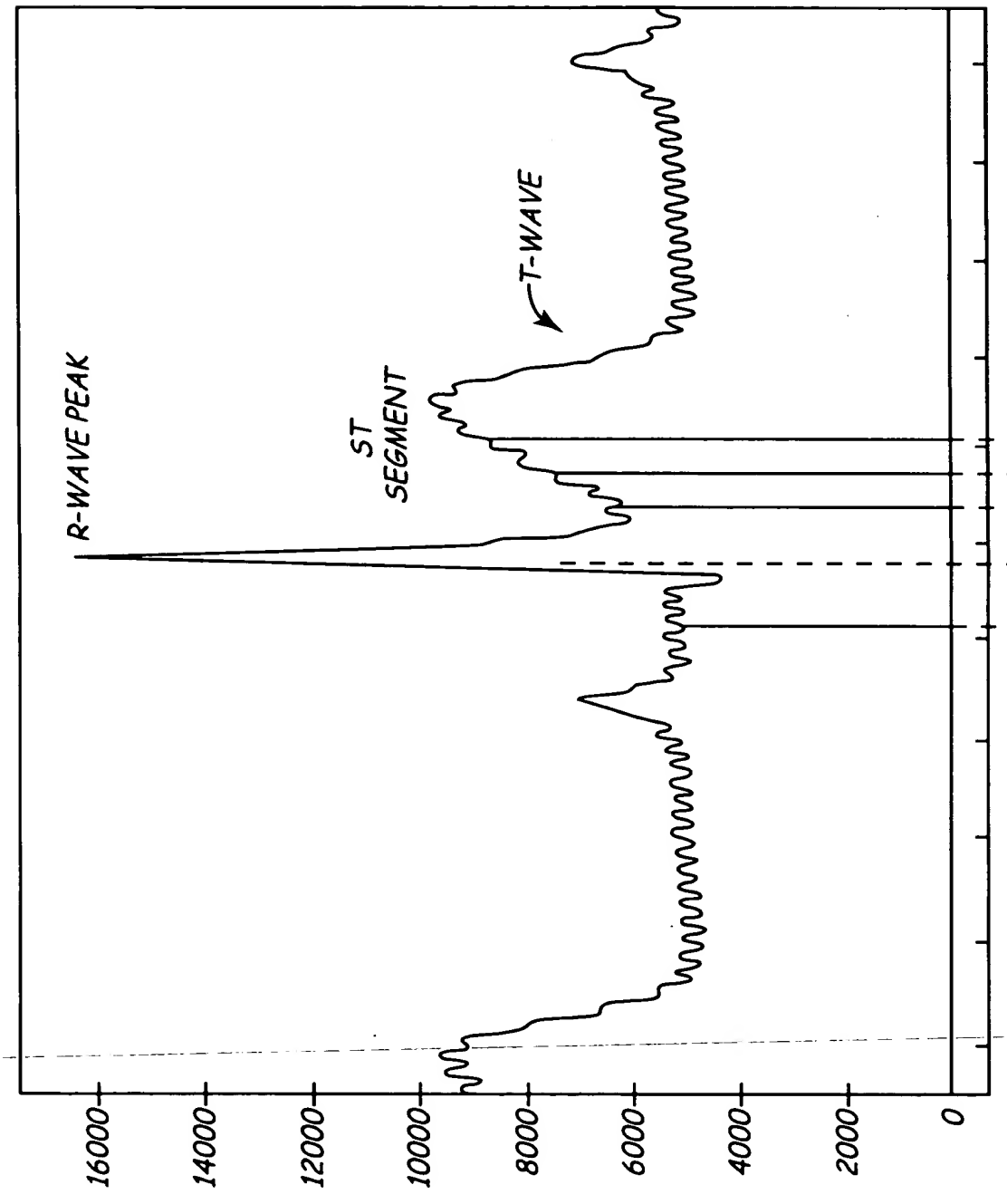
R-WAVE PEAK
ST SEGMENT
T-WAVE
1
2
3
4
RS
16000
14000
12000
10000
8000
6000
4000
2000
0

FIG. 9

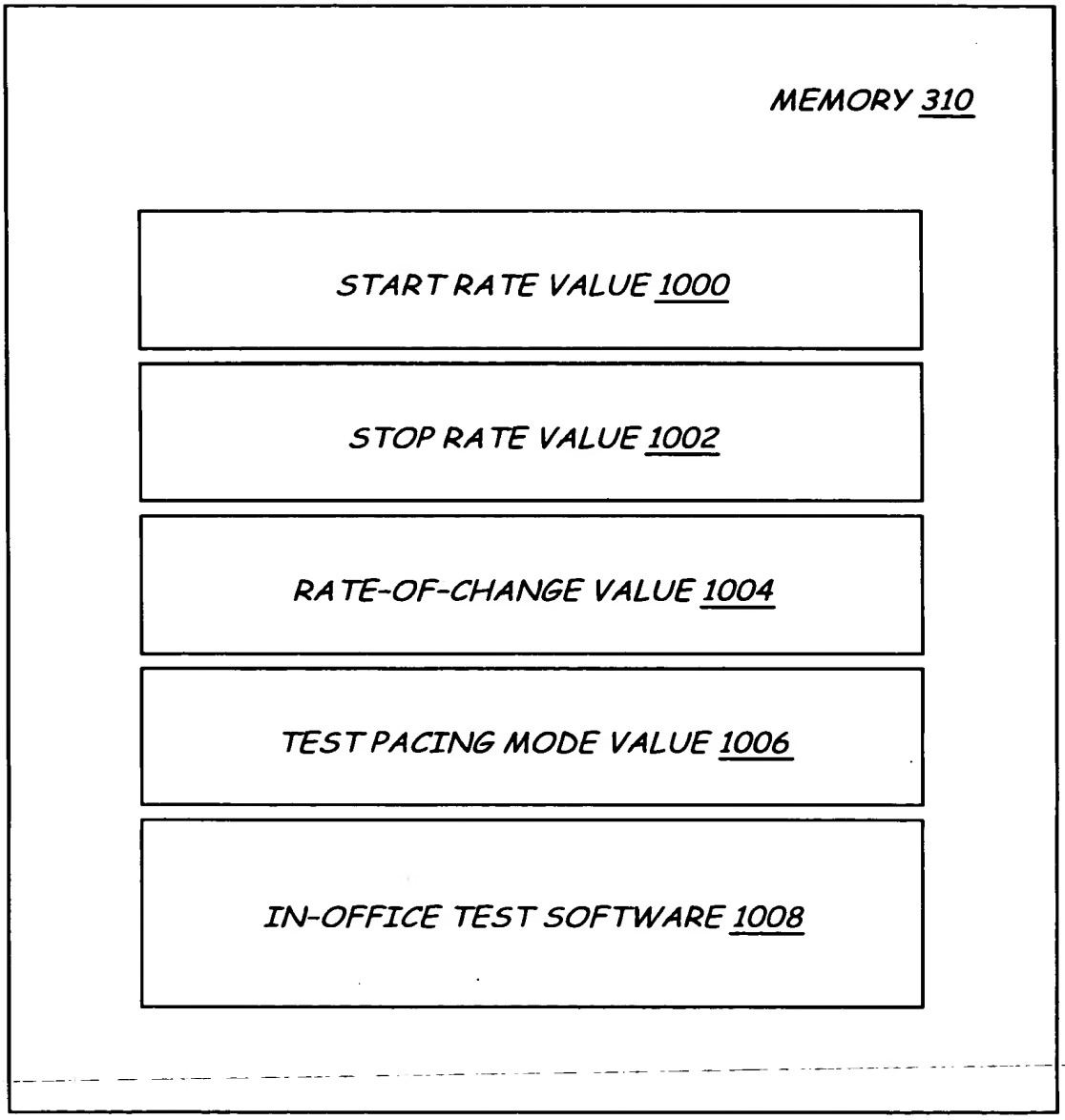
MEMORY 310
START RATE VALUE 1000
STOP RATE VALUE 1002
RATE-OF-CHANGE VALUE 1004
TEST PACING MODE VALUE 1006
IN-OFFICE TEST SOFTWARE 1008

FIG. 10

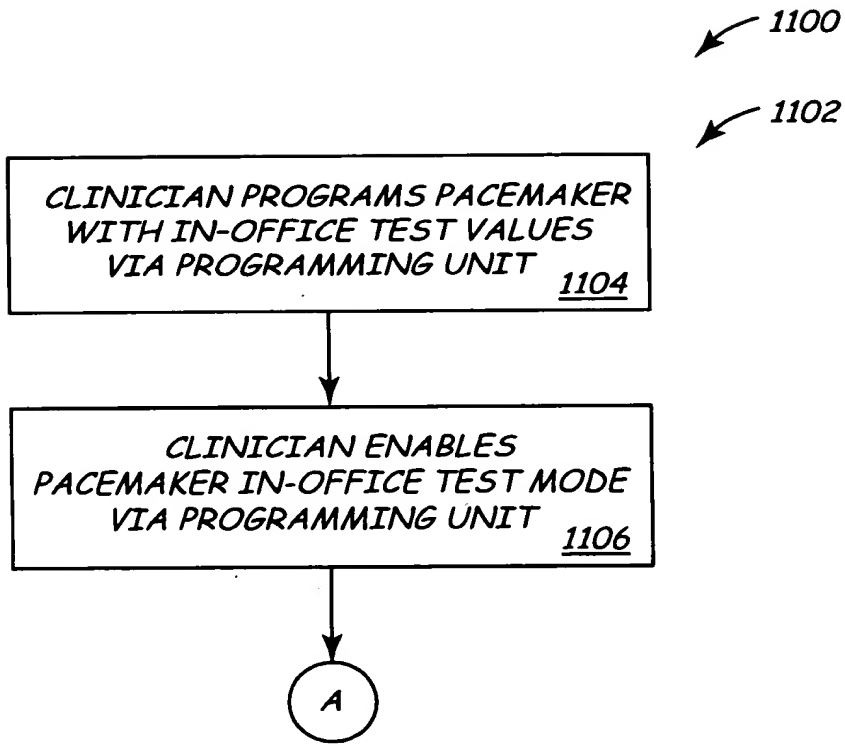
1100
1102
CLINICIAN PROGRAMS PACEMAKER WITH IN-OFFICE TEST VALUES VIA PROGRAMMING UNIT
1104
CLINICIAN ENABLES PACEMAKER IN-OFFICE TEST MODE VIA PROGRAMMING UNIT
1106
A

FIG. 11A

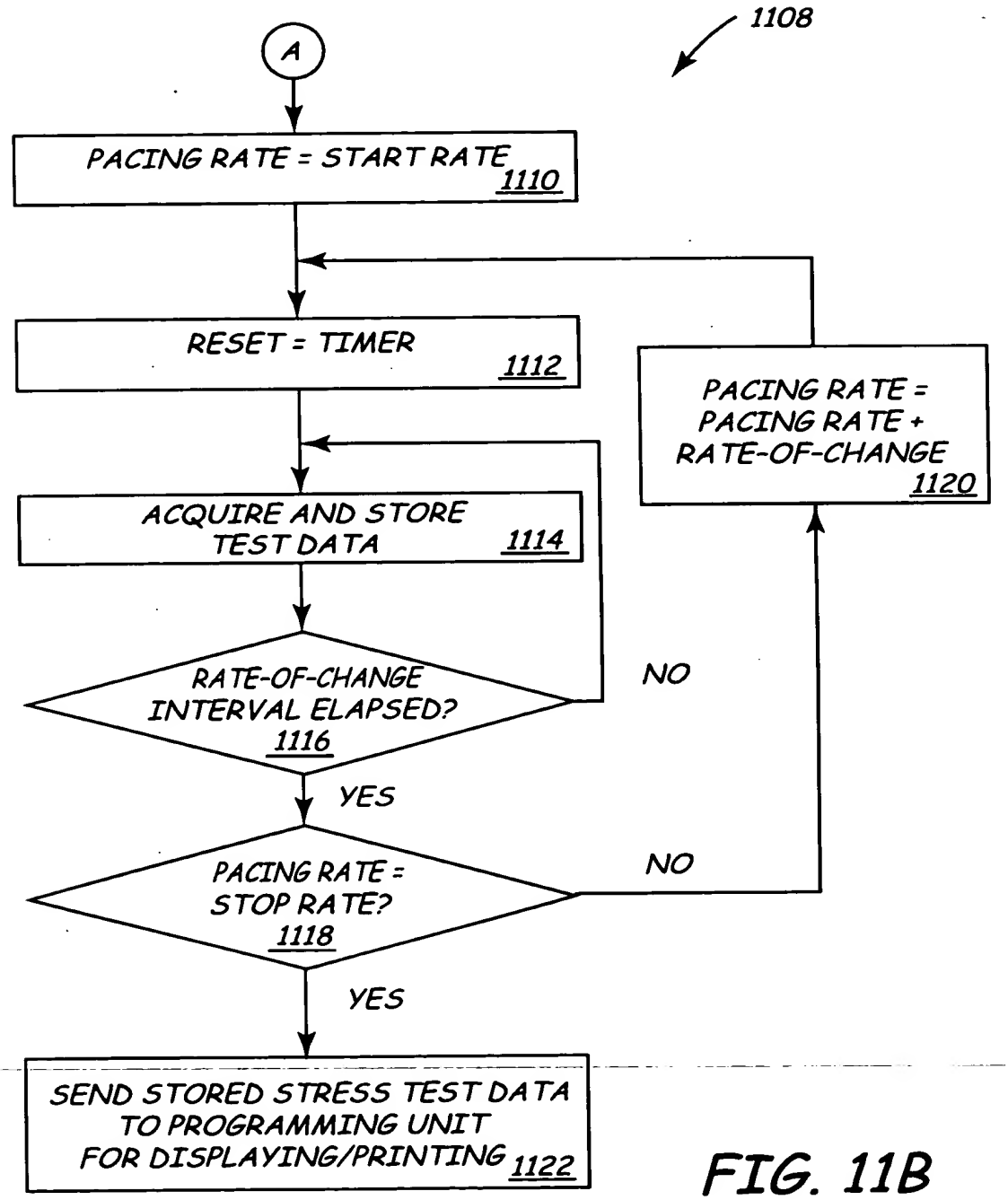
1108
A
PACING RATE = START RATE
1110
RESET = TIMER
1112
ACQUIRE AND STORE TEST DATA
1114
RATE-OF-CHANGE INTERVAL ELAPSED?
1116
NO
YES
PACING RATE = STOP RATE?
1118
NO
YES
PACING RATE = PACING RATE + RATE-OF-CHANGE
1120
SEND STORED STRESS TEST DATA TO PROGRAMMING UNIT FOR DISPLAYING/PRINTING
1122

FIG. 11B

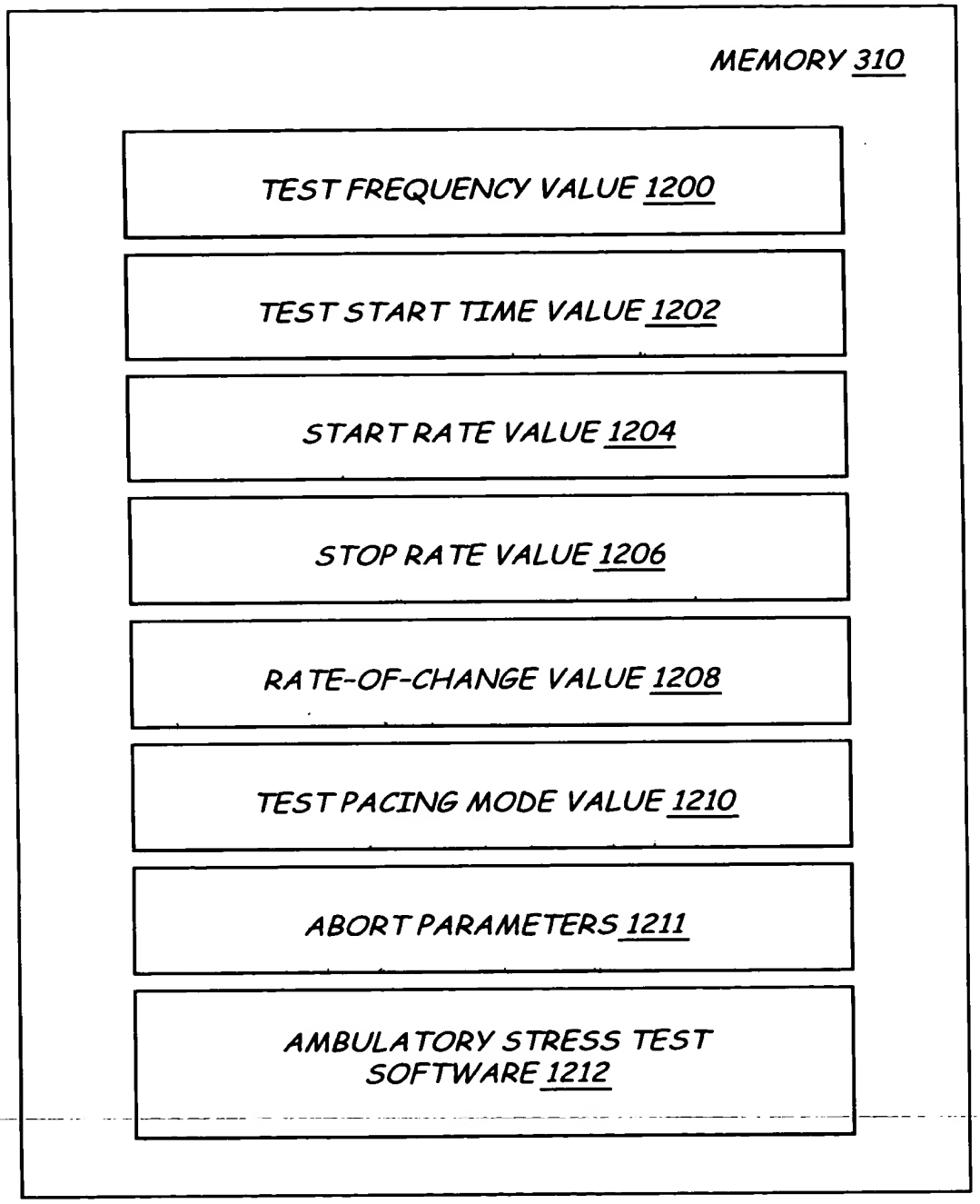
MEMORY 310
TEST FREQUENCY VALUE 1200
TEST START TIME VALUE 1202
START RATE VALUE 1204
STOP RATE VALUE 1206
RATE-OF-CHANGE VALUE 1208
TEST PACING MODE VALUE 1210
ABORT PARAMETERS 1211
AMBULATORY STRESS TEST SOFTWARE 1212

FIG. 12

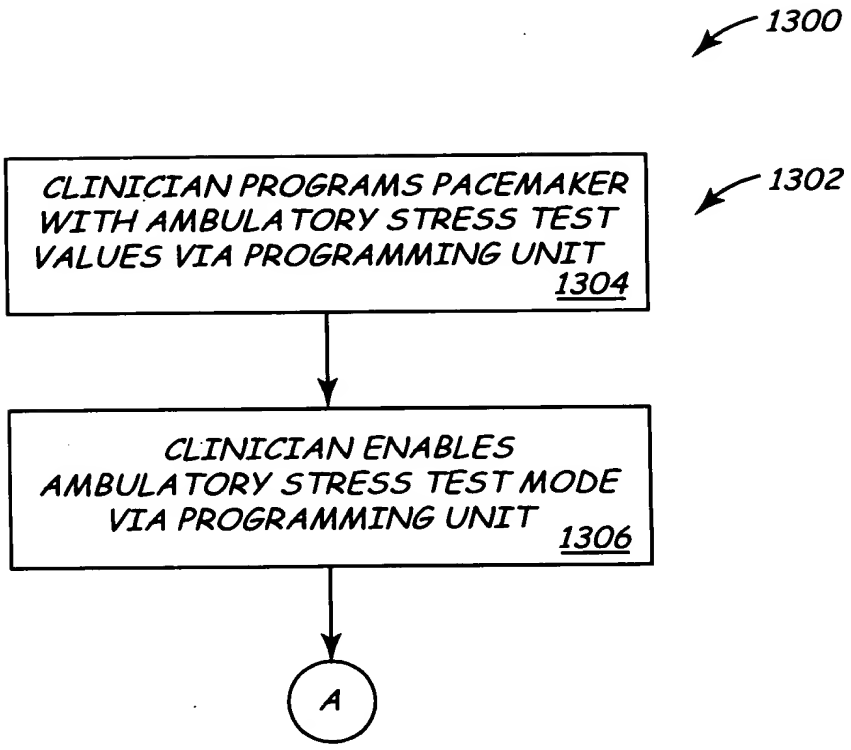
1300
CLINICIAN PROGRAMS PACEMAKER WITH AMBULATORY STRESS TEST VALUES VIA PROGRAMMING UNIT 1304
1302
CLINICIAN ENABLES AMBULATORY STRESS TEST MODE VIA PROGRAMMING UNIT 1306
A

FIG. 13A

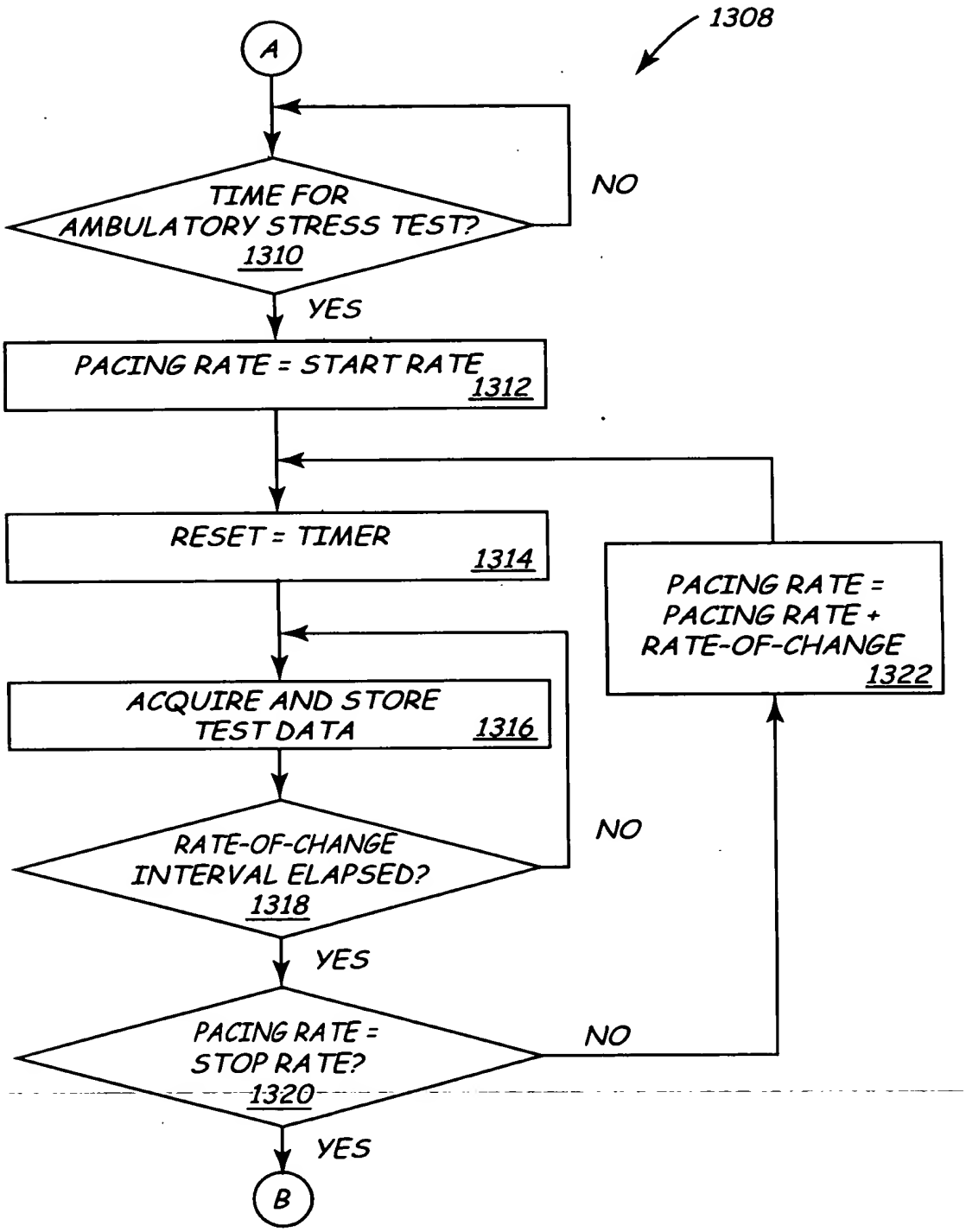
1308
A
TIME FOR AMBULATORY STRESS TEST? 1310
NO
YES
PACING RATE = START RATE 1312
RESET = TIMER 1314
ACQUIRE AND STORE TEST DATA 1316
RATE-OF-CHANGE INTERVAL ELAPSED? 1318
NO
YES
PACING RATE = STOP RATE? 1320
NO
YES
B
PACING RATE = PACING RATE + RATE-OF-CHANGE 1322

FIG. 13B

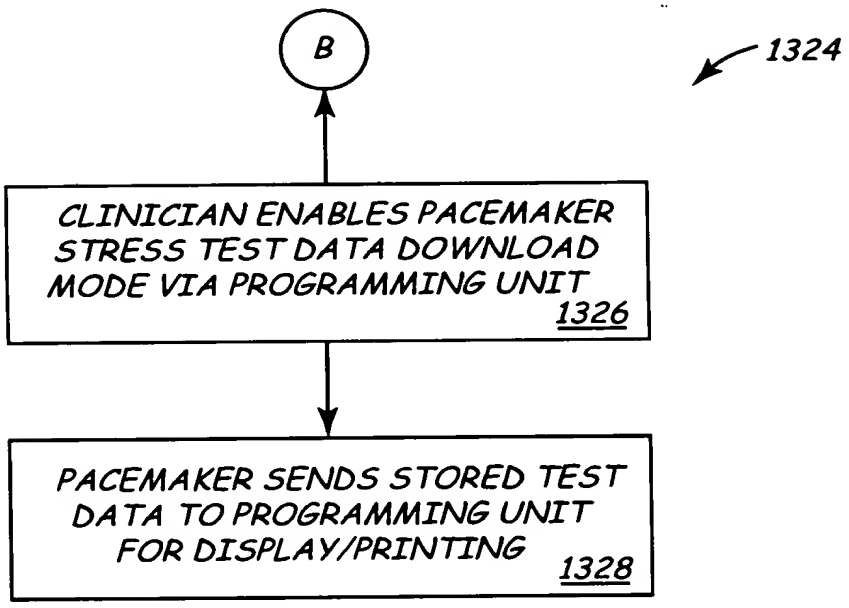
B
1324
CLINICIAN ENABLES PACEMAKER STRESS TEST DATA DOWNLOAD MODE VIA PROGRAMMING UNIT
1326
PACEMAKER SENDS STORED TEST DATA TO PROGRAMMING UNIT FOR DISPLAY/PRINTING
1328

FIG. 13C

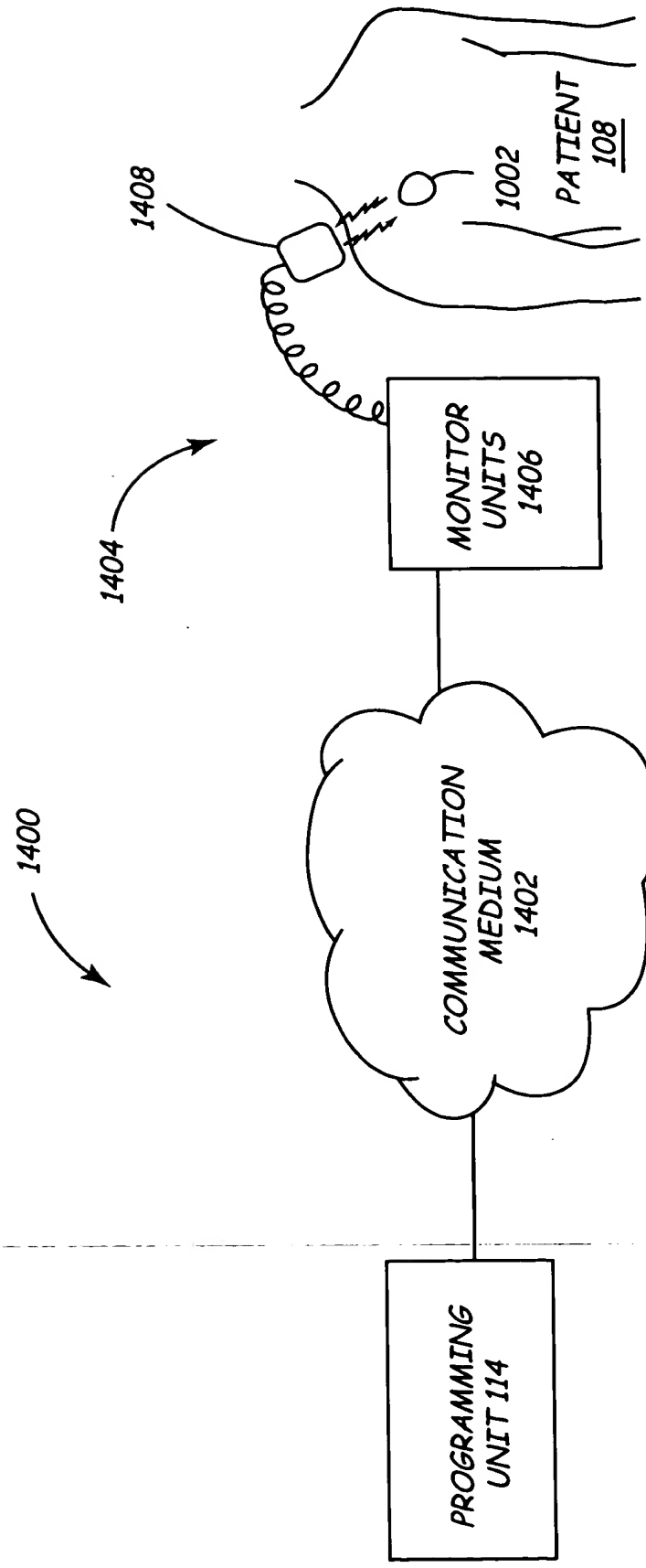
1400
1404
1408
1002
PATIENT
108
MONITOR
UNITS
1406
COMMUNICATION
MEDIUM
1402
PROGRAMMING
UNIT 114

FIG. 14

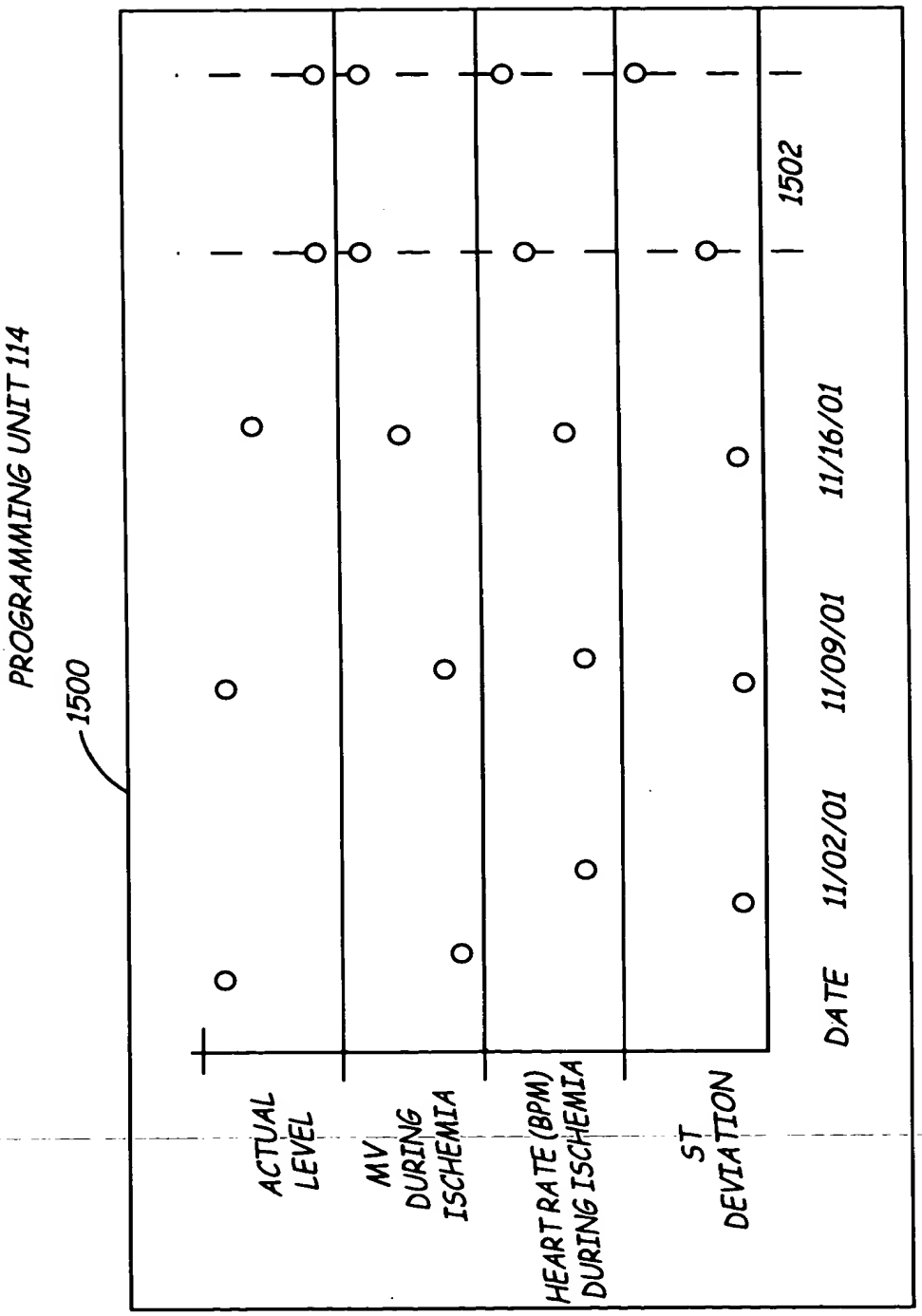
PROGRAMMING UNIT 114
1500
ACTUAL LEVEL
MV DURING ISCHEMIA
HEART RATE (BPM) DURING ISCHEMIA
ST DEVIATION
DATE
11/02/01
11/09/01
11/16/01
1502

FIG. 15

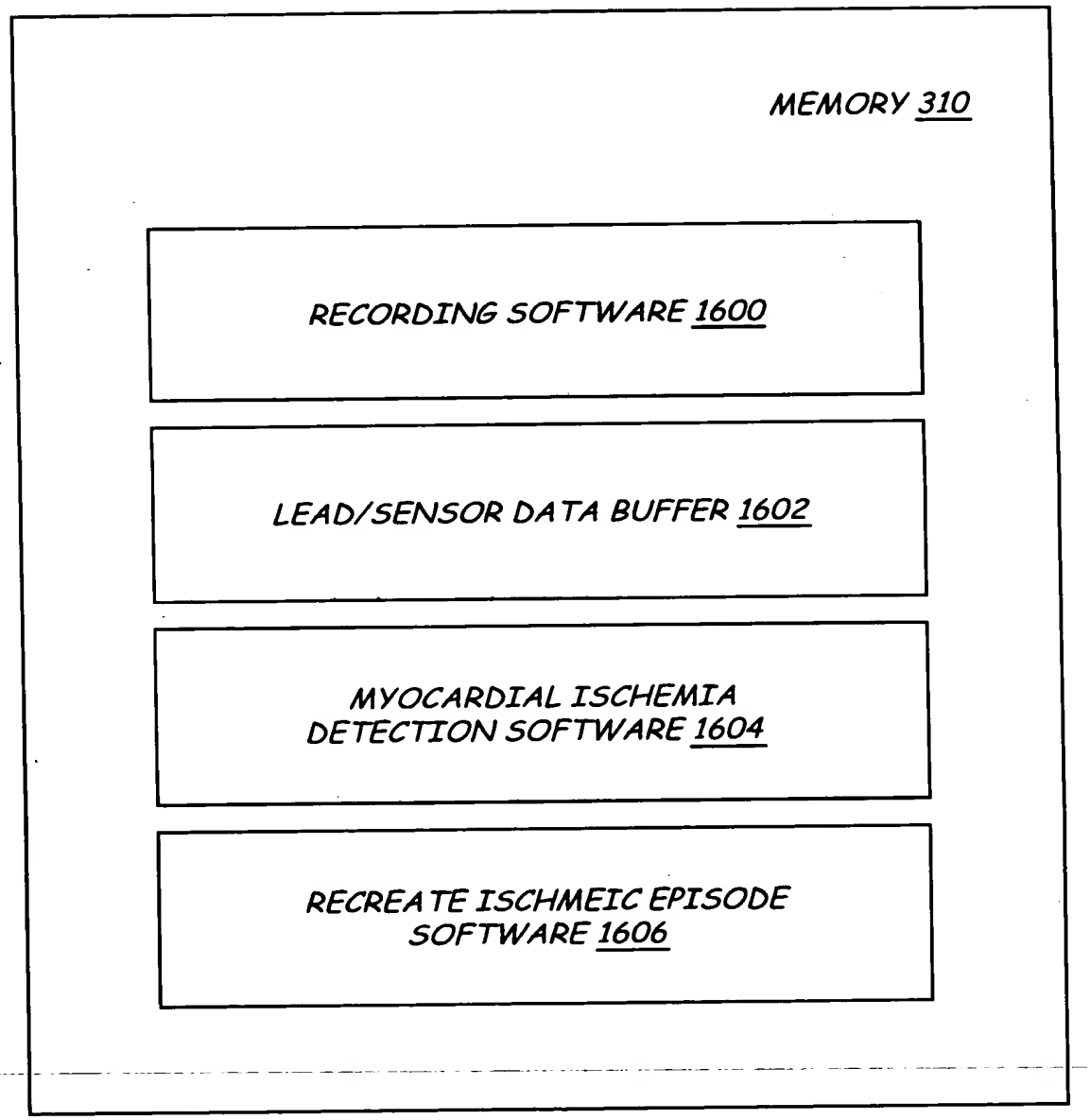
MEMORY 310
RECORDING SOFTWARE 1600
LEAD/SENSOR DATA BUFFER 1602
MYOCARDIAL ISCHEMIA DETECTION SOFTWARE 1604
RECREATE ISCHMEIC EPISODE SOFTWARE 1606

FIG. 16

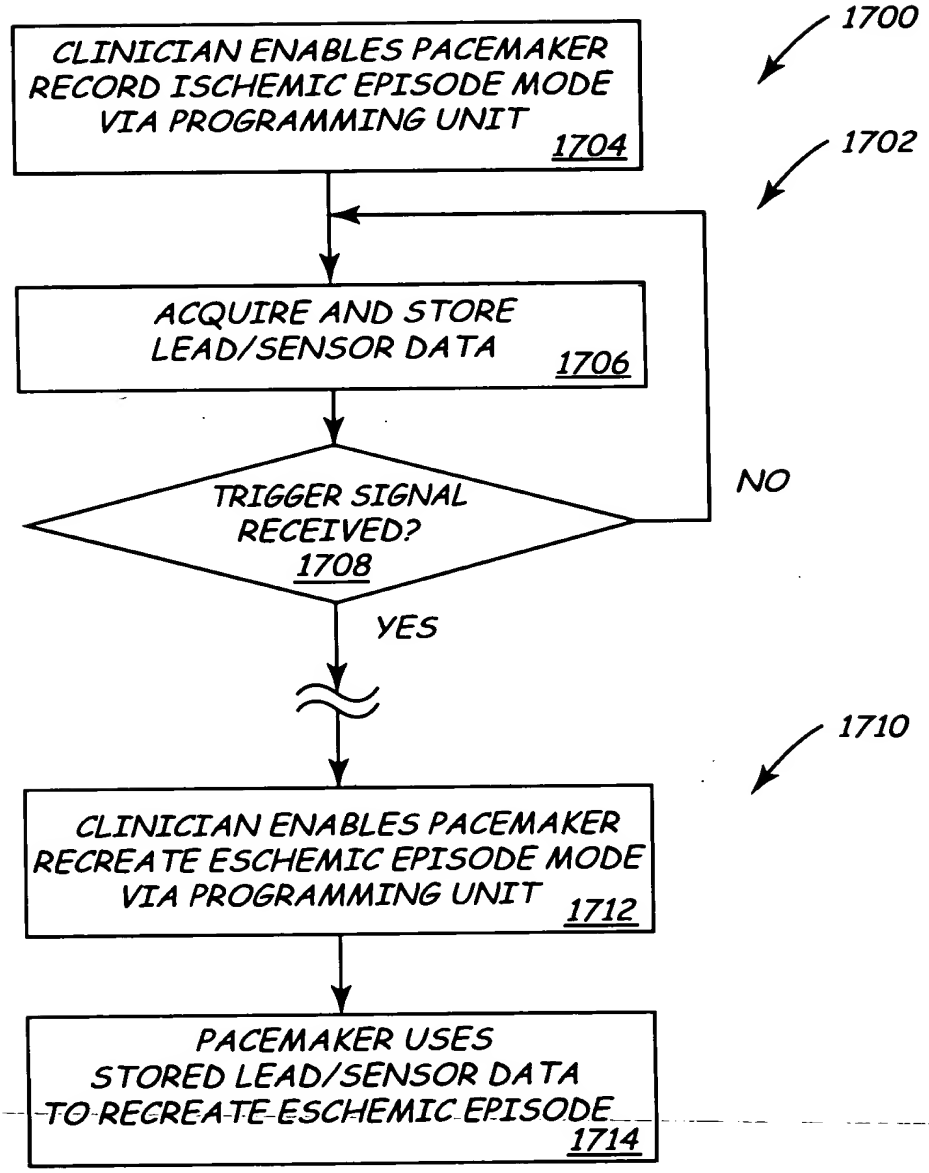
1700
CLINICIAN ENABLES PACEMAKER RECORD ISCHEMIC EPISODE MODE VIA PROGRAMMING UNIT
1704
1702
ACQUIRE AND STORE LEAD/SENSOR DATA
1706
TRIGGER SIGNAL RECEIVED?
1708
NO
YES
1710
CLINICIAN ENABLES PACEMAKER RECREATE ESCHEMIC EPISODE MODE VIA PROGRAMMING UNIT
1712
PACEMAKER USES STORED LEAD/SENSOR DATA TO RECREATE ESCHEMIC EPISODE
1714

FIG. 17

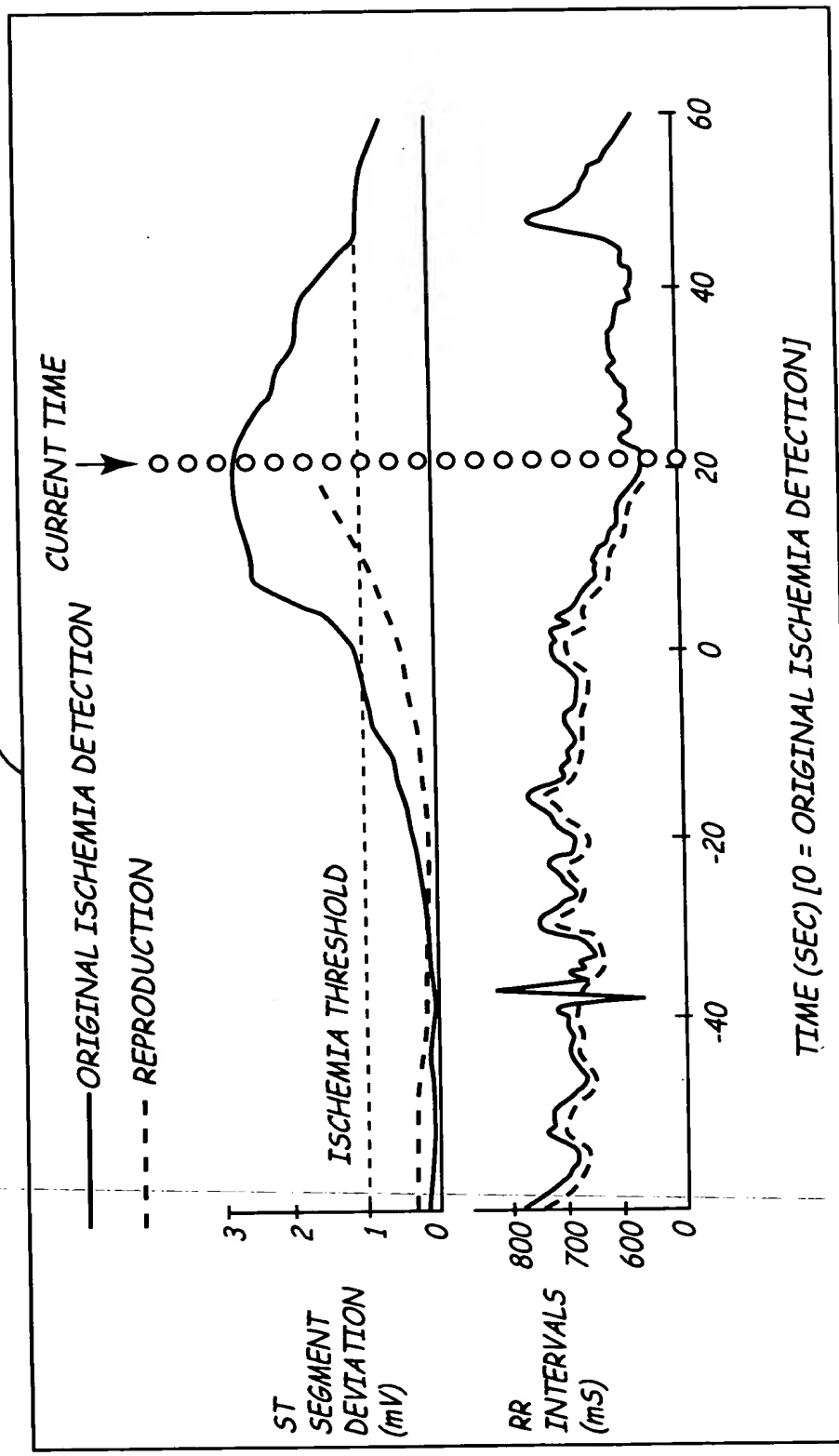
1500
PROGRAMMING UNIT 114
CURRENT TIME
ORIGINAL ISCHEMIA DETECTION
REPRODUCTION
ISCHEMIA THRESHOLD
ST SEGMENT DEVIATION (mV)
RR INTERVALS (mS)
3
2
1
0
800
700
600
0
60
40
20
0
-20
-40
TIME (SEC) [0 = ORIGINAL ISCHEMIA DETECTION]

FIG. 18